Also solved by H. A. Levy, A. M. Harding, J. A. Colson, Levi S. Shively, H. C. Feemster, Elmer Schuyler, and the Proposer.

391. Proposed by C. N. SCHMALL, New York, N. Y.

Show that the roots of the quadratic

$$ax^2 + 2bx + c = 0$$

are imaginary if a, b, c are in harmonic progression and have the same sign.

Solution by S. W. Reaves, University of Oklahoma.

Since a, b, c are in harmonic progression,

$$b = \frac{2ac}{a+c}.$$

The discriminant of the given quadratic then becomes

$$b^2 - ac = \left(\frac{2ac}{a+c}\right)^2 - ac = -ac\left(\frac{a-c}{a+c}\right)^2,$$

which is negative since a and c have the same sign. The discriminant being negative, the roots are imaginary.

Also solved by Walter C. Eells, Elmer Schuyler, F. M. Morgan, H. C. Feemster, J. A. Colson, and A. M. Harding.

Additional solutions of 387 were received from R. M. Mathews, Horace Olson, and G. Y. Sosnow, after the December issue had gone to press.

Note. We have solutions of all problems proposed during 1913 in this section up to the September number, except 385, which was published in February.

GEOMETRY.

419. Proposed by S. LEFSCHETZ, University of Nebraska.

Given a circle and a tangent to it. To find a point on its circumference such that the sum of its distances to the tangent and its point of contact shall be equal to a given e- -h.

Solution by S. W. Reaves, University of Oklahoma.

Let ORN be the given circle, OT the given tangent, and O the point of contact. Denote the given length by l.